Ionization Profile Monitor Project

Current Status of IPM Buffer Board

03 August 2004

Purpose Of IPM Project

- IPM system needed to diagnose Tevatron emittance problems during injection and ramp.
- Currently, there is no instrumentation to directly diagnose these problems.
  - AD says ”Emittance is a property related to size and density of the particle beam. If the emittance is too big the beam won't fit in its allotted space and that part of the beam is lost.”

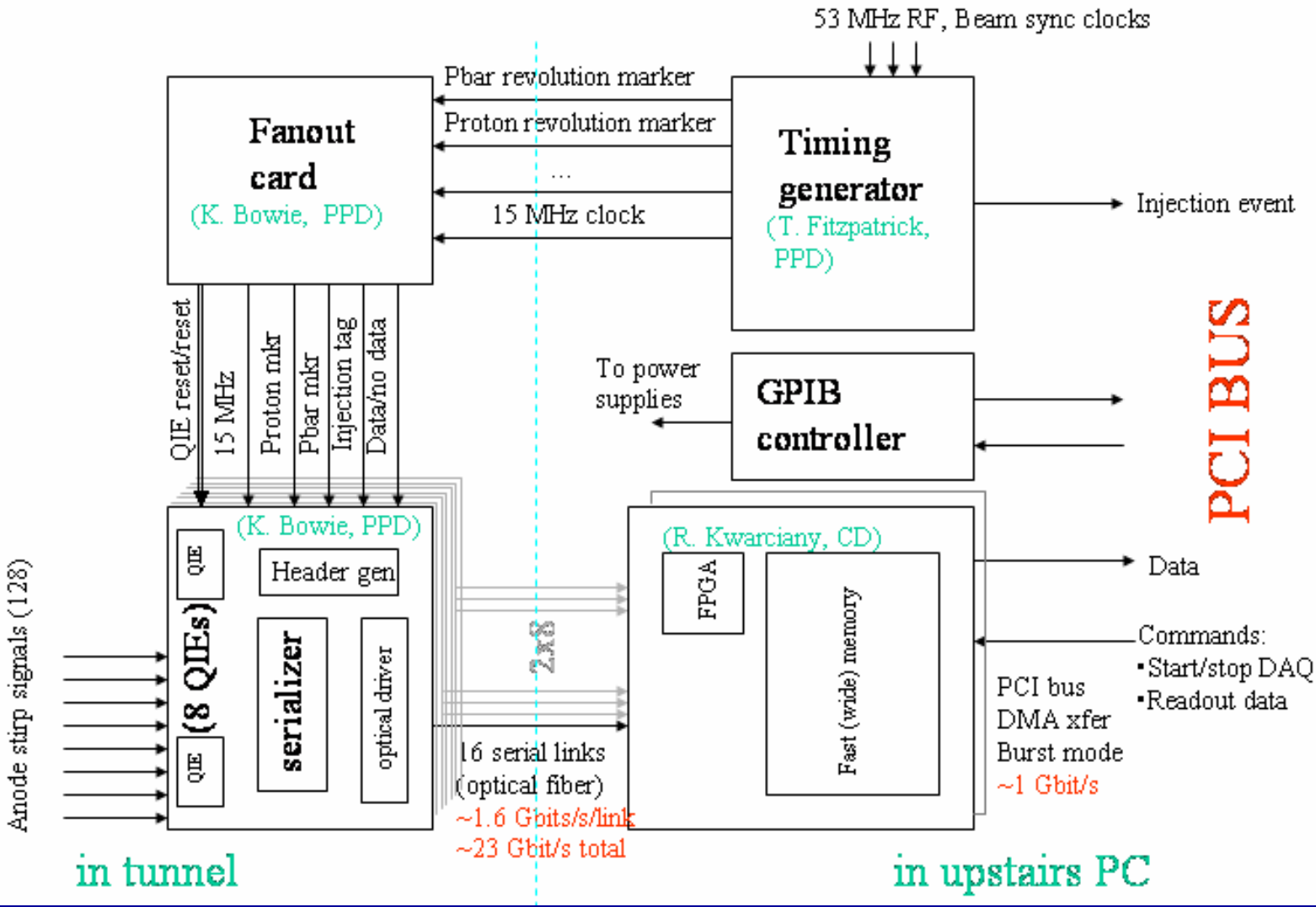
Project Requirements

- Need to be able to measure the transverse size of injected P/pbar bunches to a fairly high resolution, on a turn-by-turn basis.
- System must not significantly disturb the beam or vacuum.
- IPM requirements detailed in beams document #847.

Major Components

- 2 sets of 128 channel beam pickups, horizontal and vertical.
- 32 eight channel digitization modules (IPM front end board based on QIE chip).
- 2 fan-out cards.
- 2 timing and control modules (PCI based).
- 4 buffer modules (PCI based). CD
- 2 host PCs, horizontal and vertical.

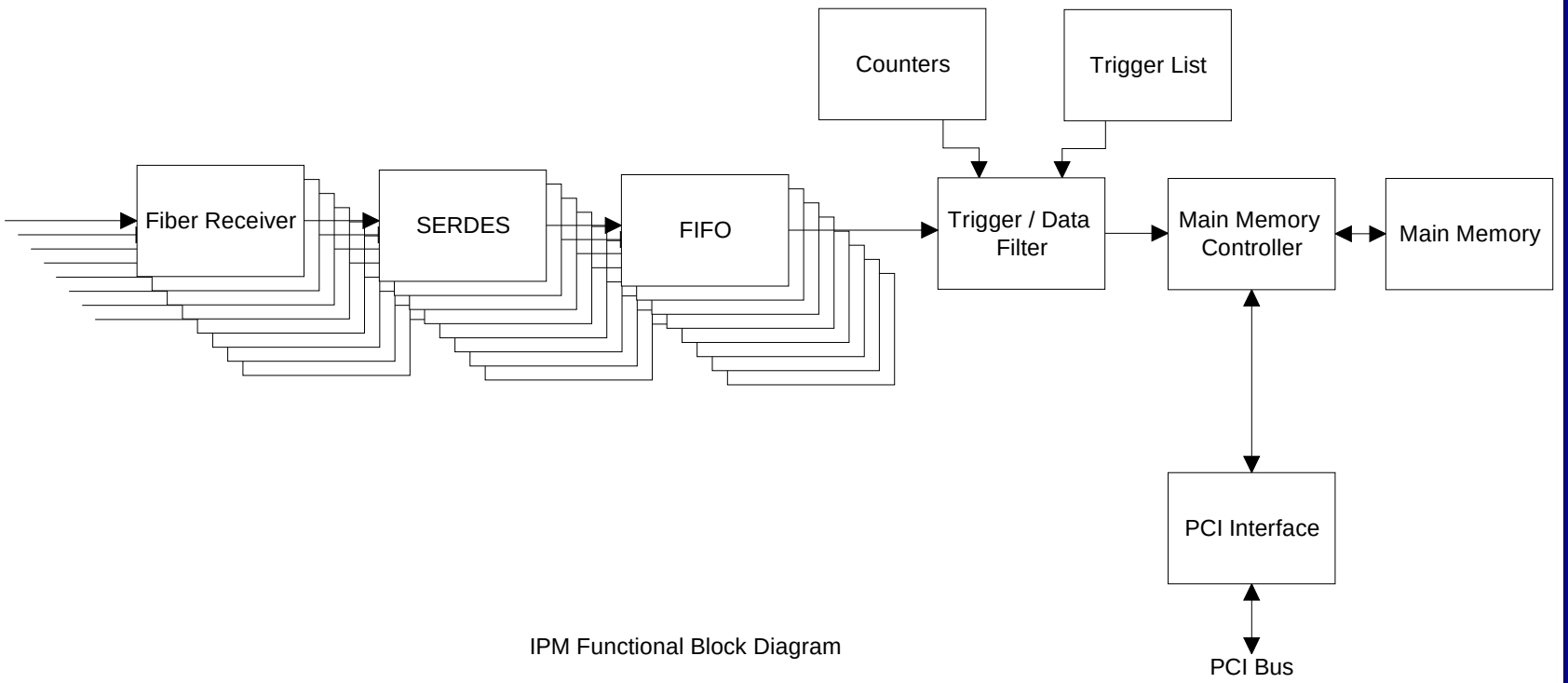
Block diagram/data flow chart



IPM Buffer Module

- This is the Computing division's contribution to the IPM project.
- A PCI card with a multi-channel optical receiver, a medium sized FPGA, 512 Mbytes of commodity DDR SDRAM and a PCI interface.
  - With BTeV specific firmware, IPM buffer module board will be used as a prototype BTeV level one buffer.

IPM Buffer Module Block Diagram



IPM Functional Block Diagram

IPM Buffer Module

Current Status of IPM Buffer Module Project

- First board is fully assembled.
- JTAG boundary scan testing is under way (tests connectivity of major components on board).
- Firmware 70% complete. Basic functions are implemented. Integer conversion, triggering and data filtering need to be added.
- Software development system is ready. Once a functioning board is available, the IPM buffer part of the software development can begin.

IPM Buffer Module Costs (8 boards)

- Parts cost per board: $1.9K
- Total Parts cost (with spares): $15K
- PC Board Fabrication: $4K
- Total IPM Buffer cost: $20.9K

Schedule

- Expect to deliver a board with software within four weeks. This board will have the basic functions implemented.
- Balance of boards to be delivered within the following eight weeks.
- Expect to deliver fully functional microcode within the next eight weeks.

❖Tunnel part of system to be installed during the Aug-Nov shutdown.


IBM
R